

NEW VERSIONS OF CLAIMS WITH INCORPORATED AMENDMENTS

Sub. 01
(1). A liquid crystal display comprising:

first and second substrates each having a display and a non-display region and being disposed to face each other;

spacers disposed in the non-display region of at least one of the first and the second substrates and being formed of photosensitive resin which regulates a cell gap between the first and the second substrates; and

liquid crystal sandwiched between the first and the second substrates,

wherein said spacers have a dynamic hardness value from 26 to 30, which is obtained by the following formula:

$$DH = K \times P_{\max} / h_{\max}^2,$$

wherein DH is dynamic hardness, K is a constant value based on an indentator inherent to the liquid crystal display, Pmax is maximum load, and hmax is the total maximum variation obtained by adding elastic deformation and plastic deformation.

(2). A liquid crystal display comprising:

first and second substrates each having a display and a non-display region and being disposed to face each other;

spacers disposed in the non-display region of at least one of the first and the second substrates and being formed of

photosensitive resin which regulates a cell gap between the first and the second substrates; and

liquid crystal sandwiched between the first and the second substrates,

wherein said spacers have a hardness value of plastic deformation (HV) from 38 to 46, which is obtained by the following formula:

$$HV = K \times P_{\max} / h_r^2,$$

wherein HV is hardness of plastic deformation, K is a constant value based on an indentator inherent to the liquid crystal display, P_{\max} is maximum load, and h_r is variation when the tangent in the maximum variation point of a curb has no load in the case of unloading.

(3). A liquid crystal display comprising:

first and second substrates each having a display and a non-display region and being disposed to face each other;

spacers disposed in the non-display region of at least one of the first and the second substrates and being formed of photosensitive resin which regulates a cell gap between the first and the second substrates; and

liquid crystal sandwiched between the first and the second substrates,

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Cmt wherein said spacers have dynamic hardness value (DH) from 26 to 30, which is obtained by the following formula:

$$DH = K \times P_{\max} / h_{\max}^2,$$

wherein DH is dynamic hardness, K is a constant value based on an indentator inherent to the liquid crystal display, P_{\max} is maximum load, and h_{\max} is the total maximum variation obtained by adding elastic deformation and plastic deformation,

and wherein said spacers have a hardness value of plastic deformation (HV) from 38 to 46, which is obtained by the following formula:

$$HV = K \times P_{\max} / h_r^2,$$

wherein HV is hardness of plastic deformation, K is a constant value based on an indentator inherent to the liquid crystal display, P_{\max} is maximum load, and h_r is variation when the tangent in the maximum variation point of a curb has no load in the case of unloading.

Q1 (4) The liquid crystal display of Claim 1, wherein said spacers have elastic coefficient from 100 to 500 kg/mm².

(5) The liquid crystal display of Claim 1 wherein said spacers have linear expansion coefficient which is nearly equal to the

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coefficient of volume expansion per unit area of the liquid crystal.

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(13) The liquid crystals according to claim 1 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.

(14) The liquid crystals according to claim 2 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.

(15) The liquid crystals according to claim 3 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.

(16) The liquid crystals according to claim 4 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of

the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.

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(17) The liquid crystals according to claim 5 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.

(18) The liquid crystals according to claim 6 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.

(19) The liquid crystals according to claim 7 wherein said spacers have the ratio of one side of the upper to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%.


(20) The liquid crystals according to claim 12 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal

to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

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(21) The liquid crystals according to claim 13 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

(22) The liquid crystals according to claim 14 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

(23) The liquid crystals according to claim 15 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

 (24) The liquid crystals according to claim 16 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

(25) The liquid crystals according to claim 17 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

(26) The liquid crystals according to claim 18 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

(27) The liquid crystals according to claim 19 wherein said spacers have the length of one side of the upper bottom equal to one side of the lower bottom decreased by certain ratio from the maximum height of said spacers, or the diameter of the upper

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correct bottom equal to that of the lower bottom decreased by said ratio from the maximum height of said spacers.

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Sub B3 (29). The method according to claim 28 wherein said selecting of a photosensitive resin comprises choosing a photosensitive resin based on at least one of the group consisting of:

(a) a dynamic hardness value from 26 to 30, which is obtained by the following formula:

$$DH = K \times P_{\max} / h_{\max}^2,$$

wherein DH is dynamic hardness, K is constant, P_{\max} is maximum load, and h_{\max} is the total maximum variation obtained by adding elastic deformation and plastic deformation;

(b) a hardness value of plastic deformation (HV) from 38 to 46, which is obtained by the following formula:

$$HV = K \times P_{\max} / h_r^2,$$

wherein HV is hardness of plastic deformation, K is constant, P_{\max} is maximum load, and h_r is variation when the tangent in the maximum variation point of a curb has no load in the case of unloading;

(c) dynamic hardness value from 26 to 30, which is obtained by the following formula:

$$DH = K \times P_{\max} / h_{\max}^2,$$

wherein DH is dynamic hardness, K is a constant value based on an indentator inherent to the liquid crystal display, P_{\max} is maximum load, and h_{\max} is the total maximum variation obtained by

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adding elastic deformation and plastic deformation and wherein said spacers have a hardness value of plastic deformation (HV) from 38 to 46, which is obtained by the following formula:

$$HV = K \times P_{\max} / h_r^2,$$

wherein HV is hardness of plastic deformation, K is said constant, P_{\max} is maximum load, and h_r is variation when the tangent in the maximum variation point of a curb has no load in the case of unloading;

(d) an elastic coefficient from 100 to 500 kg/mm²; a linear expansion coefficient which is nearly equal to the coefficient of volume expansion per unit area of the liquid crystal;

(e) the ratio of one side of the upper bottom to one side of the lower bottom for a rectangle or the ratio of the diameter of the upper bottom to the diameter of the lower bottom for circular shape of from 50 to 90%; and

(f) a column occupancy ratio from 0.05 to 0.86%, which is expressed as follows:

$$\text{Column occupancy ratio} = (\text{Lower bottom area of column} \times \text{column density} / \text{pixel area}) \times 100$$

Column density: Total number of columns / total number of pixels.